IN THE CLAIMS

Amend the claims as shown in the following replacement claims, the marked up version of which is attached following the marked up specification.

We Claim:

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1. A method for training a neural network that contains pulsed neurons,

a) training the neural network for a first time span such that a discrimination value is maximized, as a result whereof a maximum first discrimination value is formed;

b) forming the discrimination value dependent on pulses that are formed by the pulsed neurons within the first time span as well as on a training sequence of input quantities that are supplied to the neural network;

c) implementing the following steps interactively:
shortening the first time span to form a second time span,
forming a second discrimination value for the second time span,
when the second discrimination value is the same as the first discrimination value, then performing a new iteration with a new second time span that is formed by shortening the second time span of the preceding iteration,
otherwise, ending the method and the trained neural network is the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value.

2. A method according to claim 1, wherein an optimization method that is not gradient based is utilized for the maximization of at least one of the first discrimination value and of the second discrimination value.

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3. A method according to claim 2, wherein the optimization method is based on the ALOPEX method.

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4. A method according to claim 1, whereby the first discrimination value I(T) satisfies the following rule:

$$I(T) = I\left(s; \left\{\begin{array}{l} t_1^{(1)}, \ldots, t_m^{(1)}, \ldots, t_{k_1}^{(1)}, t_1^{(2)}, \ldots, t_m^{(2)}, \ldots, t_{k_2}^{(2)}, \ldots, \\ t_1^{(n)}, \ldots, t_m^{(n)}, \ldots, t_{k_n}^{(n)}, \ldots, t_1^{(N)}, \ldots, t_m^{(N)}, \ldots, t_{k_N}^{(N)} \end{array}\right\}\right),$$

wherein

- s references the input quantities,
- $t_m^{(n)}$ references a pulse that is generated by a pulsed neuron n at a time m within a time span [0, T],
- k_n (n = 1, ..., N) references a point in time at which the pulsed neuron n has generated the last pulse within the time span [0, T], and
- N references a plurality of pulsed neurons contained in the neural network.

5. A method according to claim 4, wherein the first discrimination value I(T) satisfies the following rule:

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$$I(T) = -\int p(out) \cdot \ln(p(out))dt_1^{(1)} \dots dt_{k_1}^{(1)} \dots dt_{k_N}^{(N)} + \\ + \sum_{j=1}^{s} p_j \int p\left(out \middle| s^{(j)}\right) \cdot \ln\left(p\left(out \middle| s^{(j)}\right)\right) dt_1^{(1)} \dots dt_{k_1}^{(1)} \dots dt_{k_N}^{(N)}$$

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with

$$p(out) = \sum_{j=1}^{s} p_j p\left(out \middle| s^{(j)}\right),$$

wherein

- $s^{(j)}$ references an input quantity that is applied to the neural network at a time j,
- p_j references a probability that the input quantity $s^{(j)}$ is applied to the neural network at a pint in time j,
- $p(out|s^{(j)})$ references a conditioned probability that a pulse is generated by a pulsed neuron in the neural network under the condition that the input quantity $s^{(j)}$ is applied to the neural network at a point in time j.

6. A method according to claim 1, wherein the training sequence of inputs quantities are is of measured physical signals.

7. A method according to claim 6, wherein the training sequence of input quantities is signals of an electroencephalogram.

8. A method for classification of a sequence of input quantities upon employment of a neural network that contains pulsed neurons and was trained, comprising to the following steps:

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a) training the neural network for a first time span such that a discrimination value is maximized, as a result whereof a maximum first discrimination value is formed;

b) forming the discrimination value dependent on pulses that are formed by the pulsed neurons within a first time span as well as on a training sequence of input quantities that are supplied to the neural network;

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c) implementing the following steps interactively:
shortening the first time span to form a second time span,
forming a second discrimination value for the second time span,
when the second discrimination value is the same as the first discrimination value, then performing a new iteration with a new second time span that is formed by shortening the second time span of the preceding iteration,
otherwise, ending the method and the trained neural network is the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value,

supplying the sequence of input quantities to the neural network; and
forming a classification signal that indicates what kind of sequence of input quantities the supplied sequence is.

9. A method according to claim 9, wherein the training sequence of input quantities and the sequence of input quantities are measured physical signals.

10. A method according to claim 9, wherein the training sequence of input quantities and the sequence of input quantities are measured signals of an electroencephalogram.

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11. A neural network that contains pulsed neurons has been trained according to the following steps:

a) the neural network is trained such for a first time span that a discrimination value is maximized, as a result whereof a maximum first discrimination value is formed;

b) the discrimination value is formed dependent on pulses that are formed by the pulsed neurons within the first time span as well as on a training sequence of input quantities that are supplied to the neural network;

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c) the following steps are interactively implemented:

the first time span is shortened to form a second time span,

a second discrimination value is formed for the second time span,

when the second discrimination value is the same as the first discrimination value, then a new iteration ensues with a new second time span that is formed by shortening the second time span of the preceding iteration,

otherwise, the method is ended and the trained neural network is the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value.

12. A neural network according to claim 10, wherein the network is utilized for classification of a physical signal.

13. A neural network according to claim 10, utilized for the classification of an electroencephalogram signal.

14. An arrangement for training a neural network that contains pulsed neurons comprising:

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a processor that is configured such that the following steps implemented:

a) the neural network is trained such for a first time span that a discrimination value is maximized, as a result whereof a maximum first discrimination value is formed;

b) the discrimination value is formed dependent on pulses that are formed by the pulsed neurons within the first time span as well as on a training sequence of input quantities that are supplied to the neural network;

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c) the following steps are interactively implemented:
the first time span is shortened to form a second time span,
a second discrimination value is formed for the second time span,
when the second discrimination value is the same as the first discrimination value, then a new iteration ensues with a new second time span that is formed by shortening the second time span of the preceding iteration, and
otherwise, the method is ended and the trained neural network is the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value.

15. An arrangement according to claim 14, wherein the network is utilized for the classification of a physical signal.

16. An arrangement according to claim 14, wherein the network is utilized for the classification of a signal of an electroencephalogram.